Flow Measurement and Instrumentation

Index to Volume 4 (1993)

No 1 pp 1–56
No 2 pp 57–120
No 3 121–192
No 4 193–288

Article index

Number 1

The velocity–area method
R. Herschy 7
The stage–discharge relation
R. Herschy 11
Flow-measuring structures
W. Boiten 17
Design and installation of ultrasonic and electromagnetic flow gauging stations
D. Gibbard 25
Broad-band acoustic Doppler current profiler
E. D. Cobb 35
Aspects of river flow measurement and hydrometric data interpretation in the United Kingdom—with particular reference to low flows
T. J. Marsh 39
Flow measurement in large rivers in China
Cai Kejiang 47
Flow measurement: the dilution method
J.-L. Dutillet 51
National and international standards in streamflow measurement
R. Herschy 55

Number 2

Ultrasonic tomography for visualizing the velocity profile of air flow
K.-I. Komiya and S. Teerawatanachai 61
The application of sonic (critical flow) nozzles in the gas industry
P. H. Wright 67
Sonic nozzles meter natural gas at K-Lab
A. B. Chesnoy 73
Calibration facilities for industrial gas flow meters in The Netherlands
P. F. M. Jongerius, M. P. Van der Beek and J. G. M. Van der Grinten 77
Experience with a high-capacity piston prover as a primary standard for high-pressure gas flow measurement
H. Bellinga and F. J. Delhez 85
Large turbine meters for custody transfer measurements: the renovation of the Gasunie export stations
P. M. A. Van der Kam and A. M. Dam 91
A new international standard, ISO 9951: the measurement of gas flow in closed conduits – turbine meters
J. A. Bonner 99
Evaluation of a swirl-vor-tab flow conditioner
E. M. Laws and R. Harris 101
Conditioned sampled LDV measurements of throughflow velocities inside two-dimensional fluidized bed bubbles
M. Gautam, J. T. Jurewicz, G. M. Palmer and S. R. Kale 109

Number 3

Turbine flowmeters: II. Theoretical and experimental published information
R. C. Baker 123
A polarimetric interferometry-based optical fibre pressure sensor with potential application to flow measurement
P. V. Yupapin, K. Weir, K. T. V. Grattan and A. W. Palmer 145
Signal quality of a vortex flowmeter exposed to swirling flows
A. Laneville, A. Strzelecki, P. Gajan and P. Hebrard 151
Experimental investigation of spatial concentration spectra of a solid in a slurry in horizontal pipeline flow
J. K. Keska 155
Experimental investigation of periodic flow in branching pipes
I. Karagoz 163
Turbulent flow characteristics in an S-shaped diffusing duct
J. H. Whitelaw and S. C. M. Yu 171
Semiconductor long-range anemometer using a 5 mW diode laser and a PIN photodiode
D. Dopheide, M. Faber and G. Taux 181

Number 4

Development of the T-ring vortex meter
T. Cousins and A. T. J. Hayward 197
Design conditions for optimal dual bluff body vortex flowmeters
J. P. Bentley and R. A. Benson 205
Mass flowmeter detecting fluctuations in lift generated by vortex shedding
I. Itoh and S. Ohki 215
Analysis of signals from vortex flowmeters
J. E. Amadi-Echendu, Hengjun Zhu and E. H. Higham 225
Numerical study of vortex shedding from different shaped bluff bodies
A. K. El Wahed, M. W. Johnson and J. L. Sproston 233
Progress in hydrodynamic oscillator type flowmeters
H. Yamasaki 241
Evolution of an improved vortex generator
J. T. Turner, C. O. Popiel and D. I. Robinson 249
A T-shaped vortex shedder for a vortex flowmeter
J. J. Miau, C. C. Yang, J. H. Chou and K. R. Lee 259
Vortex wake transit time measurements for flow metering
J. Coulthard and Y. Yan 269
Comparisons of different bluff bodies in vortex wake transit time measurements
J. Coulthard and Y. Yan 273
Installation effects on vortex shedding flowmeters
M. Takamoto, H. Utsumi, N. Watanabe and Y. Terao 277

Book Reviews 119, 187

Calendar 56, 120, 190, 286

Author Index

Amadi-Echendu, J. E. 225

Baker, R. C. 123
Bellinga, H. 85
Benson, R. A. 205
Bentley, J. P. 205
Boiten, W. 17
Bonner, J. A. 99

Chesnoy, A. B. 73
Chou, J. H. 259
Cobb, E. D. 35
Coulthard, J. 269, 273
Cousins, T. 197

Dam, A. M. 91
Delhez, F. J. 85
Dopheide, D. 181
Dutillet, J.-L. 51

El Wahed, A. K. 233

Faber, M. 181

Gajan, P. 151
Gautam, M. 109
Gibbard, D. 25
Grattan, K. T. V. 145

Harris, R. 101
Hayward, A. T. J. 197
Hebrard, P. 151
Herschy,R. 7, 11, 55
Higham, E. H. 225

Itoh, I. 215

Johnson, M. W. 233
Jongerius, P. F. M. 77
Jurewicz, J. T. 109

Kale, S. R. 109
Karagoz, I. 163
Kejiang, C. 47
Keska, J. K. 155
Komiya, K.-I. 61

Laneville, A. 151
Laws, E. M. 101
Lee, K. R. 259

Marsh, T. J. 39
Miau, J. J. 259

Ohki, S. 215

Flow Measurement and Instrumentation

Index to Volume 4 (1993)

No 1 pp 1–56
No 2 pp 57–120
No 3 121–192
No 4 193–288

Article index

Number 1

The velocity–area method
R. Herschy 7
The stage–discharge relation
R. Herschy 11
Flow-measuring structures
W. Boiten 17
Design and installation of ultrasonic and electromagnetic flow gauging stations
D. Gibbard 25
Broad-band acoustic Doppler current profiler
E. D. Cobb 35
Aspects of river flow measurement and hydrometric data interpretation in the United Kingdom—with particular reference to low flows
T. J. Marsh 39
Flow measurement in large rivers in China
Cai Kejiang 47
Flow measurement: the dilution method
J.-L. Dutillet 51
National and international standards in streamflow measurement
R. Herschy 55

Number 2

Ultrasonic tomography for visualizing the velocity profile of air flow
K.-I. Komiya and S. Teerawatanachai 61
The application of sonic (critical flow) nozzles in the gas industry
P. H. Wright 67
Sonic nozzles meter natural gas at K-Lab
A. B. Chesnoy 73
Calibration facilities for industrial gas flow meters in The Netherlands
P. F. M. Jongerius, M. P. Van der Beek and J. G. M. Van der Grinten 77
Experience with a high-capacity piston prover as a primary standard for high-pressure gas flow measurement
H. Bellinga and F. J. Delhez 85
Large turbine meters for custody transfer measurements: the renovation of the Gasunie export stations
P. M. A. Van der Kam and A. M. Dam 91
A new international standard, ISO 9951: the measurement of gas flow in closed conduits – turbine meters
J. A. Bonner 99
Evaluation of a swirl-vor-tab flow conditioner
E. M. Laws and R. Harris 101
Conditioned sampled LDV measurements of throughflow velocities inside two-dimensional fluidized bed bubbles
M. Gautam, J. T. Jurewicz, G. M. Palmer and S. R. Kale 109

Number 3

Turbine flowmeters: II. Theoretical and experimental published information
R. C. Baker 123
A polarimetric interferometry-based optical fibre pressure sensor with potential application to flow measurement
P. V. Yupapin, K. Weir, K. T. V. Grattan and A. W. Palmer 145
Signal quality of a vortex flowmeter exposed to swirling flows
A. Laneville, A. Strzelecki, P. Gajan and P. Hebrard 151
Experimental investigation of spatial concentration spectra of a solid in a slurry in horizontal pipeline flow
J. K. Keska 155
Experimental investigation of periodic flow in branching pipes
I. Karagoz 163
Turbulent flow characteristics in an S-shaped diffusing duct
J. H. Whitelaw and S. C. M. Yu 171
Semiconductor long-range anemometer using a 5 mW diode laser and a PIN photodiode
D. Dopheide, M. Faber and G. Taux 181

Number 4

Development of the T-ring vortex meter
T. Cousins and A. T. J. Hayward 197
Design conditions for optimal dual bluff body vortex flowmeters
J. P. Bentley and R. A. Benson 205
Mass flowmeter detecting fluctuations in lift generated by vortex shedding
I. Itoh and S. Ohki 215
Analysis of signals from vortex flowmeters
J. E. Amadi-Echendu, Hengjun Zhu and E. H. Higham 225
Numerical study of vortex shedding from different shaped bluff bodies
A. K. El Wahed, M. W. Johnson and J. L. Sproston 233
Progress in hydrodynamic oscillator type flowmeters
H. Yamasaki 241
Evolution of an improved vortex generator
J. T. Turner, C. O. Popiel and D. I. Robinson 249
A T-shaped vortex shedder for a vortex flowmeter
J. J. Miau, C. C. Yang, J. H. Chou and K. R. Lee 259
Vortex wake transit time measurements for flow metering
J. Coulthard and Y. Yan 269
Comparisons of different bluff bodies in vortex wake transit time measurements
J. Coulthard and Y. Yan 273
Installation effects on vortex shedding flowmeters
M. Takamoto, H. Utsumi, N. Watanabe and Y. Terao 277

Book Reviews 119, 187

Calendar 56, 120, 190, 286

Author Index

Amadi-Echendu, J. E. 225

Baker, R. C. 123
Bellinga, H. 85
Benson, R. A. 205
Bentley, J. P. 205
Boiten, W. 17
Bonner, J. A. 99

Chesnoy, A. B. 73
Chou, J. H. 259
Cobb, E. D. 35
Coulthard, J. 269, 273
Cousins, T. 197

Dam, A. M. 91
Delhez, F. J. 85
Dopheide, D. 181
Dutillet, J.-L. 51

El Wahed, A. K. 233

Faber, M. 181

Gajan, P. 151
Gautam, M. 109
Gibbard, D. 25
Grattan, K. T. V. 145

Harris, R. 101
Hayward, A. T. J. 197
Hebrard, P. 151
Herschy,R. 7, 11, 55
Higham, E. H. 225

Itoh, I. 215

Johnson, M. W. 233
Jongerius, P. F. M. 77
Jurewicz, J. T. 109

Kale, S. R. 109
Karagoz, I. 163
Kejiang, C. 47
Keska, J. K. 155
Komiya, K.-I. 61

Laneville, A. 151
Laws, E. M. 101
Lee, K. R. 259

Marsh, T. J. 39
Miau, J. J. 259

Ohki, S. 215

Palmer, A. W. 145
Palmer, G. M. 109
Popiel, C. O. 249

Robinson, D. I. 249

Sproston, J. L. 233
Strzelecki, A. 151

Takamoto, M. 277
Taux, G. 181
Teerawatanachai, S. 61
Terao, Y. 277
Turner, J. T. 249

Utsumi, H. 277

van der Beek, M. P. 77
van der Grinten, J. G. M. 77
van der Kam, P. M. A. 91

Watanabe, N. 277
Weir, K. 145
Whitelaw, J. H. 171
Wright, P. H. 67

Yamasaki, H. 241
Yan, Y. 269, 273
Yang, C. C. 259
Yu, S. C. M. 171
Yupapin, P. V. 145

Zhu, H. 225

Keyword index

Air flow
CT technique, Velocity profile, 61

Bluff bodies
Vortex flowmeters, Dual bluff body combination, 205
Vortex shedding, Simulation, 233
Branching pipes
Periodic flow, Laser light sheet, 163

CT technique
Velocity profile, Air flow, 61
Calibration
Low flow rate, Flowmeters, 77
Concentration measurements
Two-phase flow, Slurry flow, 155
Condensation
Sonic nozzle, Elemental sulfur, 73
Condition monitoring
Vortex flowmeters, Signal processing, 225
Critical flow venturi
Sonic nozzles, Nozzle intercomparison, 67
Custody transfer measurements
Turbine meters, 91
ISO 9951, Turbine meters, 99

Dilution method
Flow measurement, Standardization, 51
Diode laser LDA
Long range LDA, Flowmeter, 181
Discharge
Open channels, Velocity, 7
Hydrometry, Measurement, 47
Discharge measurement
Doppler, Velocity, 35
Doppler
Discharge measurement, Velocity, 35
Dual bluff body combination
Vortex flowmeters, Bluff bodies, 205

Electromagnetic flow gauge
Ultrasonic flow gauge, Time-of-flight, 25
Elemental sulfur
Sonic nozzle, Condensation, 73

Fibre optic sensor
Interferometry, Pressure sensor, 145
Figure of merit
Vortex shedding, Vortex generators, 249
Flow conditioning
Swirl-tab, Vor-tab, 101
Flow gauging structures
Weirs, Flumes, 17
Flow measurement
Hydrometric networks, Gauging stations, 39
Dilution method, Standardization, 51
Flow meters
Calibration, Low flow rate, 77
Flowmeter
Long range LDA, Diode laser LDA, 181
Fluctuations in lift
Mass flowmeter, Vortex flowmeter, 215
Fluidized bed
Laser Doppler anemometer, Throughflow velocities, 109
Flumes
Flow gauging structures, Weirs, 17

Gas flow measurement
Piston prover, Standards, 85
Gauging stations
Flow measurement, Hydrometric networks, 39

Hot film anemometer
Vortex flowmeter, Swirling flow, 151
Hydrodynamic oscillators
Vortex shedding, Vortex flowmeters, 241
Hydrometric networks
Flow measurement, Gauging stations, 39
Hydrometry
Measurement, Discharge, 47
Standards, Streamflow, 55

ISO 9951
Turbine meters, Custody transfer measurements, 99
Installation effects
Vortex flowmeters, Standards, 277
Interferometry
Fibre optic sensor, Pressure sensor, 145

Laser Doppler anemometer
Throughflow velocities, Fluidized bed, 109
Laser Doppler anemometry
Refractive matching technique, Secondary flow, 171
Laser light sheet
Branching pipes, Periodic flow, 163
Logarithmic rating equation
Station control, Zero flow, 11
Long range LDA
Diode laser LDA, Flowmeter, 181
Low flow rate
Calibration, Flow meters, 77

Mass flowmeter
Vortex flowmeter, Fluctuations in lift, 215
Measurement
Hydrometry, Discharge, 47

Nozzle intercomparison
Sonic nozzles, Criical flow venturi, 67

Open channels
Velocity, Discharge, 7

Periodic flow
Branching pipes, Laser light sheet, 163
Piston prover
Standards, Gas flow measurement, 85
Pressure sensor
Interferometry, Fibre optic sensor, 145
Published information
Turbine flowmeters, Standards, 123

Refractive matching technique
Laser Doppler anemometry, Secondary flow, 171

Secondary flow
Laser Doppler anemometry, Refractive matching technique, 171
Signal processing
Vortex flowmeters, Condition monitoring, 225
Simulation
Vortex shedding, Bluff bodies, 233
Slurry flow
Two-phase flow, Concentration measurements, 155
Sonic nozzle
Condensation, Elemental sulfur, 73
Sonic nozzles
Critical flow venturi, Nozzle intercomparison, 67
Standardization
Flow measurement, Dilution method, 51
Standards
Streamflow, Hydrometry, 55
Piston prover, Gas flow measurement, 85
Turbine flowmeters, Published information, 123
Vortex flowmeters, Installation effects, 277
Station control
Logarithmic rating equation, Zero flow, 11
Streamflow
Standards, Hydrometry, 55
Swirl-tab
Vor-tab, Flow conditioning, 101
Swirling flow
Hot film anemometer, Vortex flowmeter, 151

T-shaped
Vortex shedder, Vortex flowmeter, 259
Throughflow velocities
Laser Doppler anemometer, Fluidized bed, 109
Time-of-flight
Ultrasonic flow gauge, Electromagnetic flow gauge, 25
Transit time
Vortex shedding, Vortex flowmeter, 269
Vortex shedding, Ultrasonic vortex flowmeter, 273
Turbine flowmeters
Published information, Standards, 123
Turbine meters
Custody transfer measurements, 91
ISO 9951, Custody transfer measurements, 99
Two-phase flow
Concentration measurements, Slurry flow, 155

Ultrasonic flow gauge
Time-of-flight, Electromagnetic flow gauge, 25
Ultrasonic vortex flowmeter
Vortex shedding, Transit time, 273

Velocity
Open channels, Discharge, 7
Doppler, Discharge measurement, 35

Velocity profile
CT technique, Air flow, 61
Vor-tab
Swirl-tab, Flow conditioning, 101
Vortex flowmeter
Hot film anemometer, Swirling flow, 151
Mass flowmeter, Fluctuations in lifts, 215
Vortex shedder, T-shaped, 259
Vortex shedding, Transit time, 269
Vortex flowmeters
Bluff bodies, Dual bluff body combination, 205
Signal processing, Condition monitoring, 225
Hydrodynamic oscillators, Vortex shedding, 241
Installation effects, Standards, 277
Vortex generators
Vortex shedding, Figure of merit, 249
Vortex shedder
Vortex flowmeter, T-shaped, 259
Vortex shedding
Bluff bodies, Simulation, 233
Hydrodynamic oscillators, Vortex flowmeters, 241
Vortex generators, Figure of merit, 249
Transit time, Vortex flowmeter, 269
Transit time, Ultrasonic vortex flowmeter, 273

Weirs
Flow gauging structures, Flumes, 17

Zero flow
Logarithmic rating equation, Station control, 11